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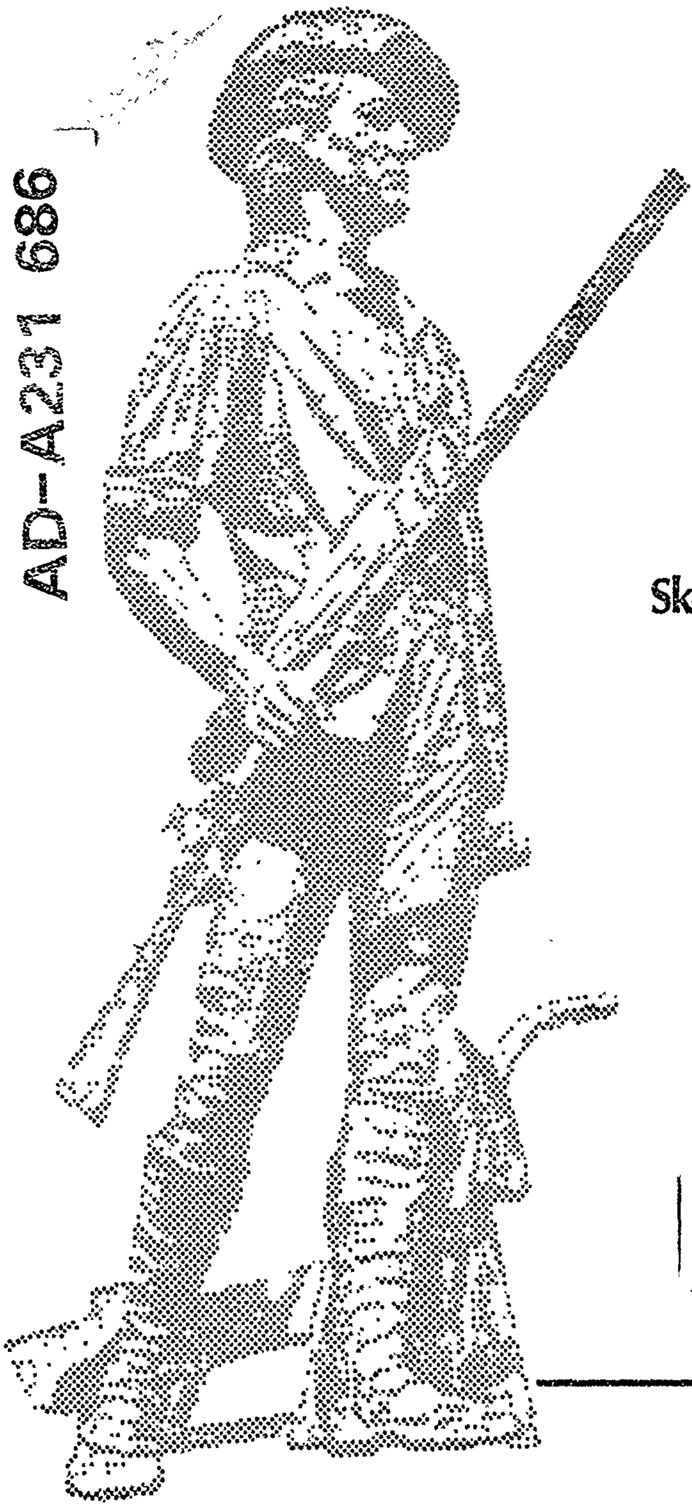
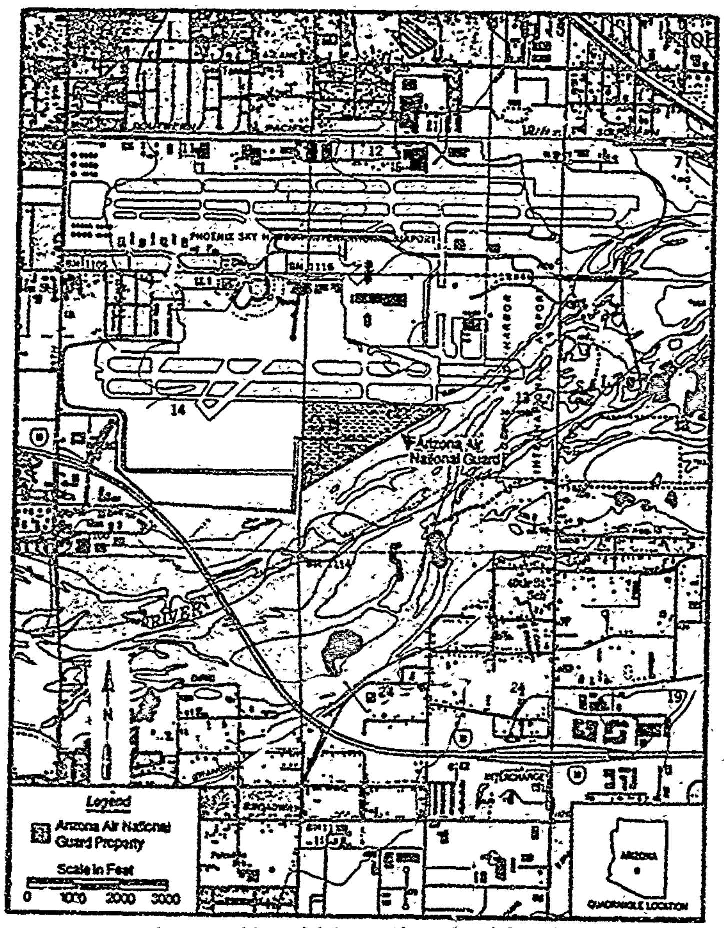
INSTALLATION RESTORATION PROGRAM



Preliminary Assessment

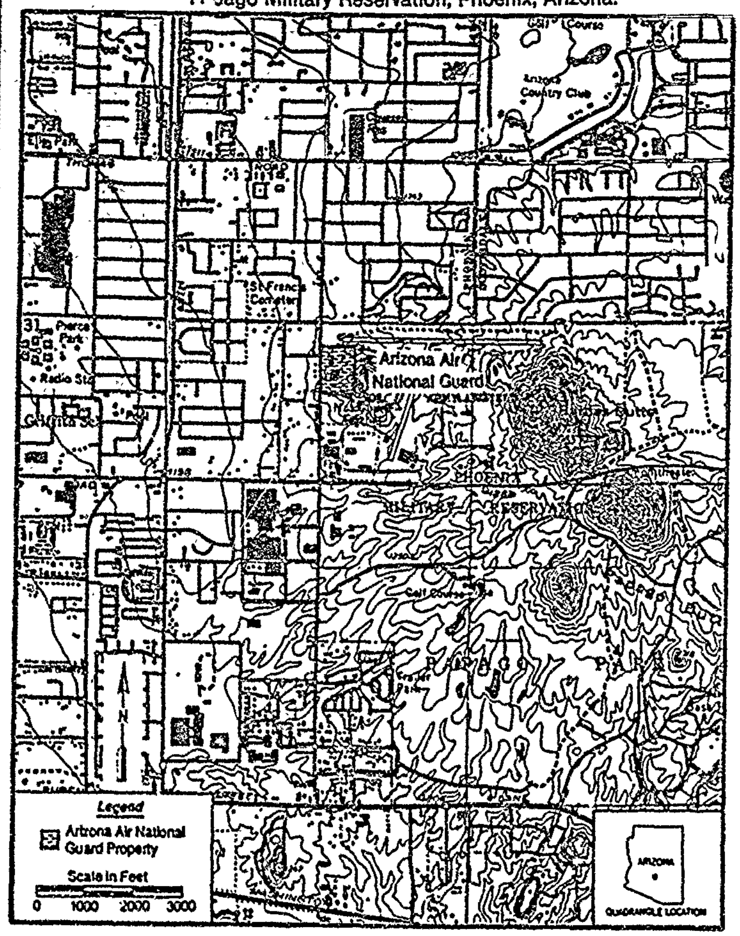
161st Air Refueling Group
Arizona Air National Guard
Sky Harbor International Airport
Phoenix, Arizona

Hazardous Materials Technical Center
July 1988



Location Map of Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona.

Location Map of Arizona Air National Guard, Papago Military Reservation, Phoenix, Arizona.



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Preliminary Assessment of suspected hazardous waste sites at the Arizona Air National Guard Base, Sky Harbor International Airport. The study was conducted under the Air National Guard's Installation Restoration Program.

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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

FOR

161st AIR REFUELING GROUP
ARIZONA AIR NATIONAL GUARD
SKY HARBOR INTERNATIONAL AIRPORT
PHOENIX, ARIZONA

July 1988

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20310

Prepared by

Hazardous Materials Technical Center
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TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTC, was retained in February 1988 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 161st Air Refueling Group (AREFG), Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona, (hereinafter referred to as the Base) under Contract No. DLA-900-82-C-4426. Also covered by this Preliminary Assessment are the tenant units of the 161st AREFG at the Papago Military Reservation, Phoenix, Arizona. These units are the 107th Tactical Control Squadron (TCS) and the 111th Air Traffic Control Flight (ATCF). The Preliminary Assessment included:

- o an onsite visit, including interviews with 26 past and present Base employees conducted by HMTC personnel during 29 February through 4 March 1988;
- o the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the Base;
- o the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies; and
- o the identification of sites on the Base that are potentially contaminated with hazardous materials/hazardous wastes (HM/HW).

B. Major Findings

Past Base operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the Base that use and dispose of HM/HW include aircraft maintenance; vehicle maintenance; aerospace ground equipment (AGE) maintenance; petroleum, oils, and lubricants (POL) management; weapons maintenance; and corrosion control. Waste oils, recovered fuels, spent cleaners, strippers, and solvents are generated by these activities.

Interviews with one airport employee and 26 past and present Base personnel (average tenure of 16.5 years) and a field survey resulted in the identification of five disposal and/or spill sites at the Base that are potentially contaminated with HM/HW. These sites were assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Methodology (HARM). The five sites are as follows:

Site No. 1 - JP-4 Hydrant Area (HAS-45)

JP-4 spills from aircraft on the northern portion of the aircraft parking apron flow westward onto an area of exposed soil around the JP-4 hydrants. In addition, small spills also occasionally occur from the hydrant system. During the site visit, this area smelled heavily of JP-4.

Site No. 2 - Hazardous Waste Storage Area (HAS-47)

The hazardous waste storage area, located west of the JP-4 hydrants, is a rectangular area enclosed by a brick wall and chain-link fencing. On pallets on a concrete pad are drums for waste JP-4, PD-680 solvent, hydraulic fluid, and 7808 oil. The ground next to the pad is stained from spillage.

Site No. 3 - Fuel Bladder Area (HAS-53)

In 1972, bladders of JP-4 and leaded AVGAS were stored on airport property just west of Building No. 25. One of the AVGAS bladders leaked continuously during the period the bladders were used (8 months to 1 year).

Site No. 4 - 107th TCS Hazardous Waste Collection Area (HAS-45)

Hazardous wastes at the Papago Military Reservation are collected in 55-gallon drums within the fenced, gravelled vehicle parking area. Drums of waste JP-4, turbine engine oil, gear oil, diesel fuel, solvent, and MOGAS are stored on pallets on the gravel. The gravel is stained from overflows from the drums.

Site No. 5 - Ammunition Dump (HAS-42)

In the late 1970s, buried ammunition was found during trenching operations east of Buildings No. 5 and 7. As unfired ammunition was routinely buried in this area from 1952 to 1957 or 1958, more ammunition may exist at this location.

C. Conclusions

Information obtained through interviews with past and present Base personnel resulted in the identification of five areas on the Base that are potentially contaminated with HM/HW. At each of the identified sites, the potential exists for contamination of surface water, soils, or groundwater and subsequent contaminant migration. Each of these sites was therefore assigned a HAS according to HARM.

D. Recommendations

Further IRP investigation is recommended for each of the five identified sites.

I. INTRODUCTION

A. Background

The 161st Air Refueling Group (AREFG) is located at the Arizona Air National Guard Base at Sky Harbor International Airport, Phoenix, Arizona (hereinafter referred to as the Base). The Base was established at the Sky Harbor Airport in 1952. The Base's tenant units, the 107th Tactical Control Squadron (TCS) and the 111th Air Traffic Control Flight (ATCF), are located about 4 miles northeast of the Base at the Papago Military Reservation, Phoenix, Arizona. These units were established in 1978. Past operations at the Base and its tenant units involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau has implemented its Installation Restoration Program (IRP). The IRP consists of the following:

- o Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.
- o Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study.
- o Research, Development and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.
- o Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement site remedial action.

B. Purpose

The purpose of this Preliminary Assessment is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. Personnel from the Hazardous Materials Technical Center (HMTC) visited the Base, reviewed existing environmental information, analyzed Base records concerning the use and

generation of hazardous material/hazardous waste (HM/HW), and conducted interviews with past and present Base personnel who are familiar with past hazardous materials management activities.

A physical inspection was made of the suspected sites. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the Base, with special emphasis on the history of the shop operations and their past HM/HW management procedures; local geologic, hydrologic, and meteorologic conditions that may affect migration of contaminants; local land use, public utilities, and zoning requirements that could affect the potential for exposure to contaminants; and the ecologic settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to the Base and its tenent units and includes:

- An onsite visit;
- The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the Base;
- The acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat, and utility data from various Federal, State, and local agencies;
- A review and analysis of all information obtained; and
- The preparation of a report to include recommendations for further actions.

The onsite visit and interviews with past and present Base personnel were conducted during the period 29 February to 4 March 1988. The Preliminary Assessment site visit was conducted by Ms. Janet Emry, Hydrogeologist/Task Manager; Mr. Raymond Clark, P.E./Department Manager; and Ms. Natasha Brock, Environmental Scientist. Other HMTC personnel who assisted with the Preliminary Assessment include Mr. Mark Johnson, Geologist/Program Manager (Appendix A). Personnel from the Air National Guard who assisted in the

Preliminary Assessment include Mr. Daniel Waltz, Hydrogeologist/Primary Project Officer (ANGSC/DER); Maj. James Eberle, Base Civil Engineer (161 CES/DE); Lt. Mona Johnson, Base Environmental Engineer (161 CES/DEV); and selected members of the 161st AREFG. The Point of Contact (POC) at the Base is Lt. Mona Johnson.

D. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This methodology ensures a comprehensive collection and review of pertinent site-specific information and is used in the identification and assess- ment of potentially contaminated hazardous waste spill/disposal sites.

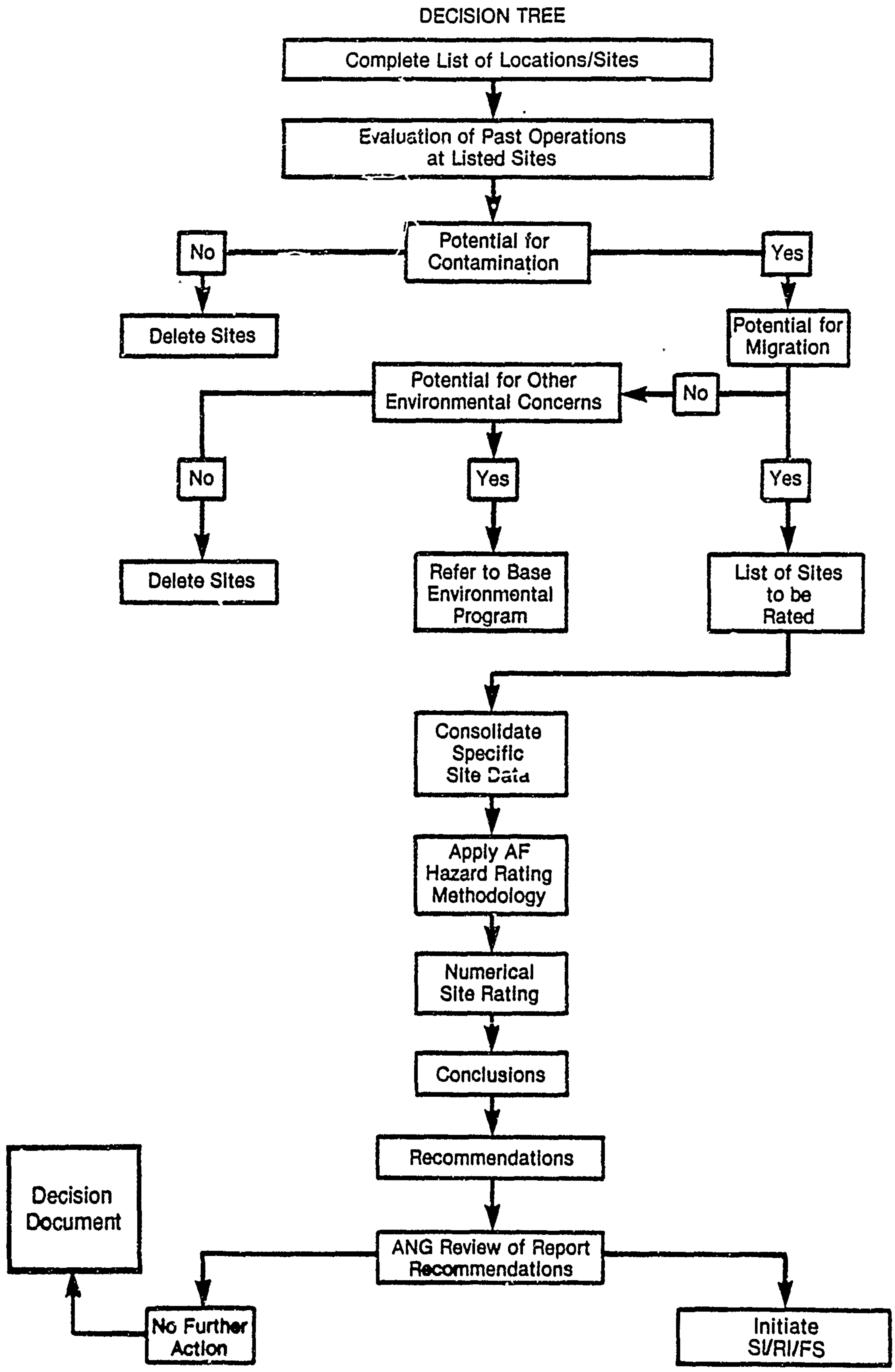
The Preliminary Assessment begins with a site visit to the Base to identify all shop operations or activities on the installation that may use hazardous materials or generate hazardous wastes. Next, an evaluation of both past and present HM/HW handling procedures is made to determine whether any environmental contamination has occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base. These interviews also define the areas on the Base where any HM/HW, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or otherwise released into the environment.

Historic records contained in the Base files are collected and reviewed to supplement the information obtained from interviews. Using this information, a list of past waste spill/disposal sites on the Base is identified for further evaluation. A general survey tour of the identified sites, the Base, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geologic, hydrologic, meteorologic, development (land use and zoning), and environmental data for the area of study is also obtained from the POC, and from appropriate Federal, State, and local agencies. A list of

PRELIMINARY ASSESSMENT
INSTALLATION
RESTORATION PROGRAM

Figure 1.
Preliminary Assessment Methodology Flow Chart.



outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW disposal and/or spills may have occurred. Where sufficient information is available, sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) (Appendix C). However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather may indicate a lack of data. The HAS is computed from the data included in the Factor Rating Criteria (Appendix D).

II. INSTALLATION DESCRIPTION

A. Location

The 161st AREFG of the Arizona Air National Guard is located at Sky Harbor International Airport, Phoenix, Maricopa County, Arizona. The Base occupies 50.7 acres south of the airport, between the southern runway and the dry Salt River. Figure 2A shows the location and boundaries of the Base property covered by this Preliminary Assessment. The 107th TCS and 111th ATCF are located about 4 miles northeast of the Base at the Papago Military Reservation, Phoenix, Maricopa County, Arizona. These units occupy 12 acres next to the Papago Buttes (Figure 2B).

The areas within a 1-mile radius of the Base and the Papago Military Reservation are primarily zoned for commercial use. The population within a 1-mile radius of the Base is approximately 250 people; within a 1-mile radius of Papago Military Reservation there are approximately 450 people.

B. Organization and History

After World War II, a number of Army Air Force squadrons were reorganized into Air Guard units. The 412th Fighter Squadron, a unit that had earned combat flying honors in Europe, was redesignated the 197th Fighter Squadron and on 12 December 1946 became the first unit of the Arizona Air National Guard. The unit, nicknamed the "Copperheads," flew the P-51 "Mustang" fighter.

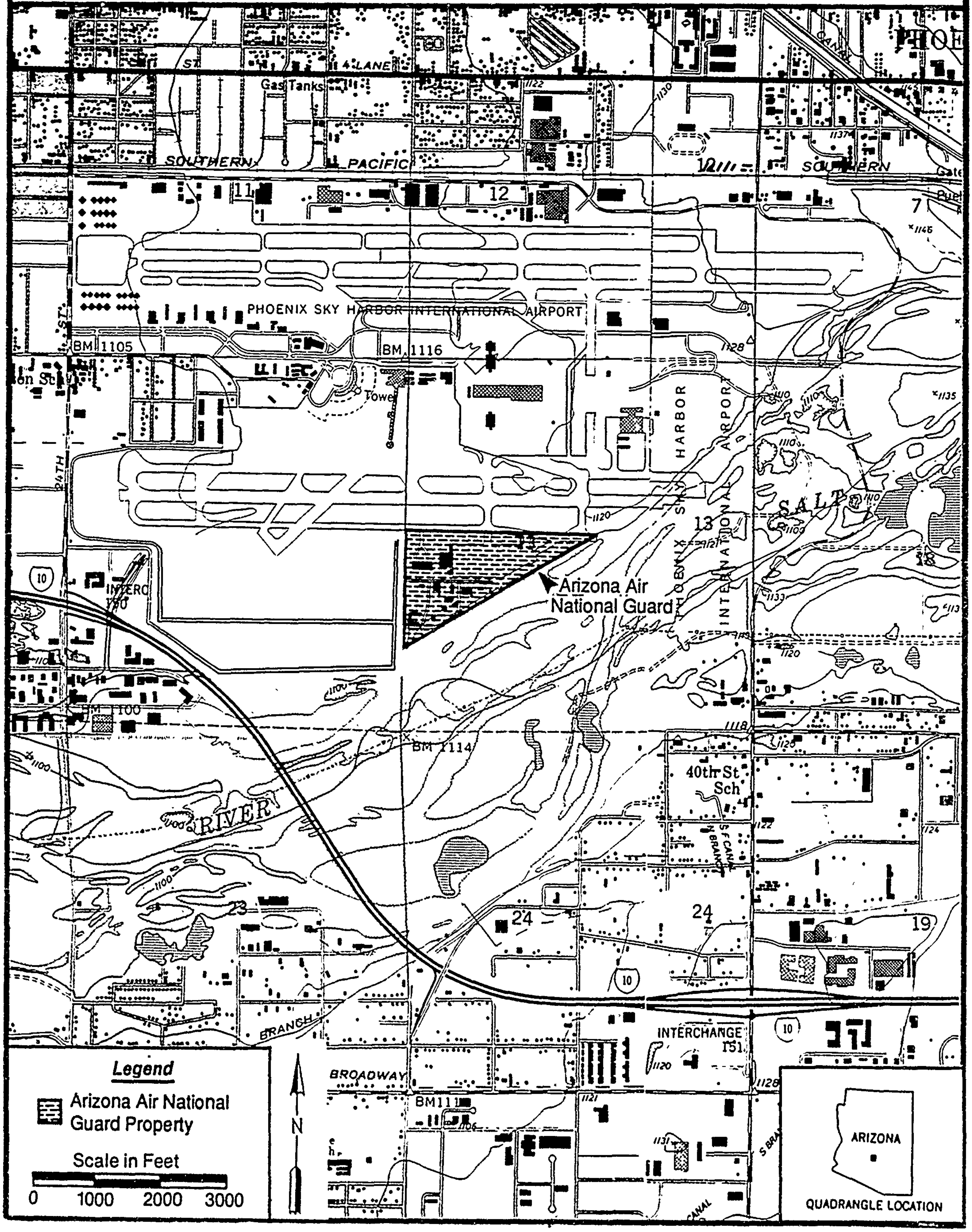
On 1 February 1951, the Copperheads were ordered into active service; some pilots went to Korea to fly combat missions, but most of the unit's personnel were used to train new Air Force recruits. At this time, the Federal Government authorized the construction of a new base at Sky Harbor Airport in Phoenix for the Arizona unit. The old P-51s were replaced by the F-86 "Saberjet" fighter.

In early 1960, the Air Force selected the Copperheads as one of three Air Guard units to receive the supersonic F-104 "Starfighter." The fighter squadron was elevated to group status and redesignated the 161st Fighter Group. In November 1961, the Phoenix Air Guard was again called to active

Source: USGS 7.5 minute topographic quadrangles, Phoenix and Tempe, Arizona.

Figure 2A.

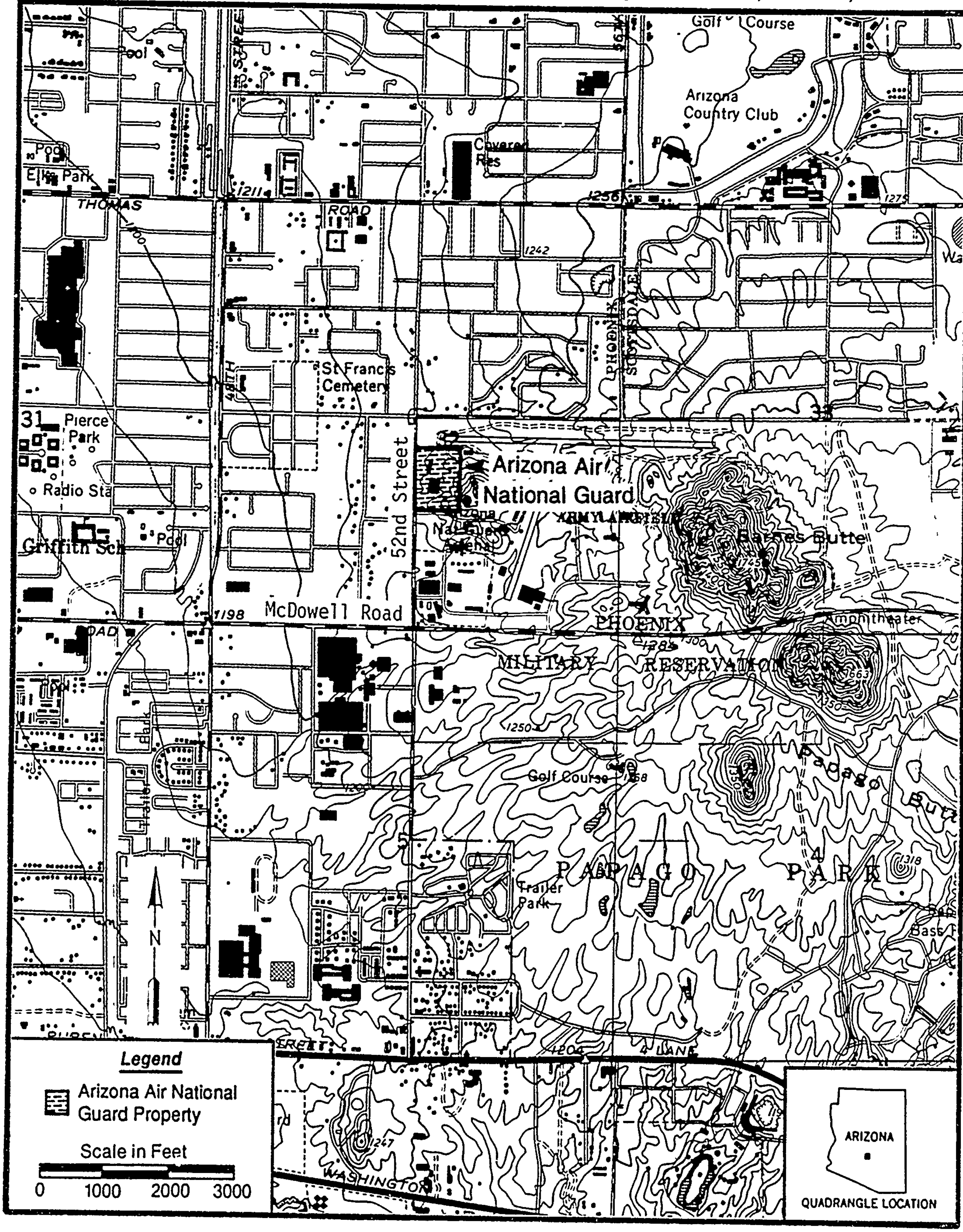
Location Map of Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona.



Source: USGS 7.5 minute topographic quadrangle, Tempe, Arizona.

Figure 2B.

Location Map of Arizona Air National Guard, Papago Military Reservation, Phoenix, Arizona.



service in Germany, to patrol the edge of the Iron Curtain as the "Berlin Wall" was constructed and to airlift supplies into West Berlin.

The Copperheads returned to Phoenix in August 1962, and were redesignated the 161st Air Transport Group, flying the four-engine Boeing C-97 "Stratofreighter" in a passenger/cargo mission for the Military Air Transport Command. Between March 1966 and September 1967, Phoenix Air Guardsmen, without being mobilized, flew 65 cargo and passenger airlift missions to combat bases in Vietnam and Thailand.

In August 1968, the Phoenix Air Guard was redesignated the 161st Aeromedical Airlift Group. The new mission for the Group involved providing medical air evacuation from overseas bases to hospitals in the U.S. while continuing to fly the Boeing C-97.

August 1972 brought the change to the present air refueling mission. Renamed the 161st Air Refueling Group, the unit was placed under the control of the Tactical Air Command. Flying an air tanker version of the reliable C-97, the unit provided air refueling service daily for the U.S. Air Force and other military aircraft operating over the Western United States.

Air Guard air refueling units, 13 in all, were placed under the control of the Strategic Air Command on 1 July 1976, marking the first time that reservists would take part in the bomber command's worldwide mission. At the same time, the Air Guard refueling units began training to operate the KC-135A aerial tanker, which is a military version of the Boeing 707 commercial jet airliner.

In early 1982, the Air Force contracted with the Boeing Military Airplane Company to remove the JT3D jet engines from commercial Boeing 707s being phased from airline service and convert them for use on KC-135As used by the 13 Air Guard air refueling units across the country By December 1982, all of the J-57 engines that had been used on the KC-135A since it entered Air Force service in 1955 were replaced with the more powerful, more efficient JT3D engine. The re-engined tankers were designated the "KC-135E." The engine modification is expected to extend the operational life of the KC-135 to well beyond the year 2000.

III. ENVIRONMENTAL SETTING

A. Meteorology

The climate of the Phoenix area is arid. Precipitation varies from year to year, but averages about 7 inches annually. Rains in summer are usually associated with tropical air from the Gulf of Mexico, which results in thunderstorms that form over the mountains to the east and then spread out over the surrounding valley. Winter precipitation is associated with middle-latitude storms that move inland from the Pacific Ocean. Snow is rare in the Phoenix area, although nearby mountain peaks above 4,000 feet often receive significant amounts (Adams, 1974). Net precipitation in Phoenix is negative 63 inches per year, according to the method outlined in the Federal Register (47 FR 31224). Maximum rainfall intensity, based on 1-year, 24-hour rainfall, is 1.5 inches (47 FR 31235).

Summers in Phoenix are warm; from early June to late September, the temperature ranges from about 70°F to 80°F at sunrise to 100°F in early afternoon. Readings of 110°F or higher occur regularly. In winter, temperatures are mild, ranging between 35°F and 40°F near daybreak to 60°F to 70°F in the afternoon. Freezing temperatures are not common (Adams, 1974; Reeter and Remick, 1986).

B. Geology

The city of Phoenix is within the Basin and Range physiographic province, which is characterized by isolated fault-block mountains separated by broad, down-dropped basins filled with mountain-derived alluvium. The basement complex that floors the basins and forms the mountains which surround Phoenix is composed of granite, gneiss, and schist of Precambrian age, conglomerate of Cretaceous/Tertiary age, and andesite of Tertiary age. The valleys are filled with unconsolidated alluvium which varies in thickness from 0 feet to more than 5,100 feet, and possibly as much as 10,000 feet in some locations (Adams, 1974; U.S. Bureau of Reclamation, 1976).

The city of Phoenix, including the Base, is within the Salt River Valley subbasin, which covers 3,177 square miles. The basin is composed of broad alluvial plains drained by the Salt and Gila Rivers. The Base is located on the nearly level valley floor, at an elevation of about 1,100 feet above mean sea level. Elevation decreases slightly, however, along the southern perimeter of the Base, due to the proximity of the Salt River channel.

The Base is underlain by unconsolidated and semiconsolidated alluvium to depths of several thousand feet. The surficial unit is composed of Pliocene to Recent gravels, sands, and sandy silts deposited by major fluvial channels. This unit, called the Upper Alluvial Unit, ranges in thickness from 0 feet near the periphery of the Salt River Valley subbasin to more than 1,200 feet near the center of the basin (U.S. Bureau of Reclamation 1976; Reeter and Remick, 1986).

Underlying the Upper Alluvial Unit is a Middle Fine-Grained Unit, which is defined as an interior-basin lacustrine and/or playa deposit of probable Pliocene age. The areal and vertical extent of this unit is extremely variable; thickness may range from 0 feet to 2,000 feet. This unit is characterized by an upper section of fine interbedded sand and silty clay, a middle section of silt and clay (with interbedded sands) with reworked evaporites, and a lower section composed primarily of evaporites with minor silt and clay (U.S. Bureau of Reclamation, 1976).

The oldest unit within the valley fill sequence is the Lower Conglomerate Unit, which is interpreted as an alluvial fan deposit. This unit, which is composed of variably cemented pebbles and cobbles, ranges in thickness from 0 feet to 2,000 feet or more, the thickest sections occurring within the deep portions of the basin (U.S. Bureau of Reclamation, 1976).

Beneath the Papago Military Reservation, a thin veneer of soil, ranging from 0 to 60 inches thick, overlies the breccia bedrock which comprises the Papago Buttes. The breccia consists of angular fragments of granitic rock in a fine-grained extrusive matrix (Johannessen & Girand, 1975).

C. Soils

According to the U.S. Soil Conservation Service, the soils at the Base consist primarily of the Carrizo fine sandy loam and the Gilman loam. The soils along the southern perimeter of the Base, adjacent to the Salt River, are considered Alluvial land.

The Carrizo fine sandy loam is a moderately alkaline, excessively drained soil which forms on the flood plains and alluvial fans of the Salt River. The surface layer of the Carrizo soil is a brown, fine sandy loam about 15 inches thick. The subsoil is a light brownish-gray very gravelly sand approximately 55 inches thick. Permeability of the Carrizo soil is very rapid, over 20 inches per hour (over 1.41×10^{-2} cm/sec). The hazard of soil blowing is slight.

The Gilman loam is a moderately alkaline, well-drained soil which forms on the flood plains and alluvial fans of the Salt River and other large streams. The surface layer of the Gilman soil is a pale brown loam about 13 inches thick. The subsoil is a light yellowish-brown loam about 47 inches thick. Permeability of the Gilman soil is moderate, from 0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec). The hazard of water erosion and soil blowing is low.

The Alluvial land consists of stratified, recently deposited stream sediment in the channels of the Salt River, including adjacent areas of alluvial material deposited by the river. These deposits may be up to 1 mile wide. The surface layer of the Alluvial land ranges in texture from gravelly sand or very gravelly sand to fine sandy loam. The material beneath the surface layer is very gravelly sand to very fine sandy loam and loam. Permeability ranges from very rapid to moderate. Soil blowing is generally a hazard.

The soils at the Papago Military Reservation consist primarily of the Cavelt gravelly loam, which is a moderately alkaline, well-drained soil which forms on fans that extend outward from the base of mountains or buttes. The

surface layer of the Cavelt soil is a light yellowish-brown gravelly loam, underlain by a light brown gravelly loam to a depth of 10 inches. The subsoil is a white hardpan consisting of pebbles cemented together with calcium carbonate (lime). The hardpan is approximately 36 inches thick. The substratum is a very pale brown gravelly loam about 14 inches thick, weakly to strongly cemented by calcium carbonate. Permeability is moderate in the upper part of the soil profile (4.45×10^{-4} to 1.41×10^{-4} cm/sec) and very slow in the hardpan (less than 4.24×10^{-5} cm/sec). The hazard of erosion is high, as runoff is very rapid.

D. Hydrology

Surface Water

The Salt River flows from its headwaters in east-central Arizona westward through the city of Phoenix to its confluence with the Gila River. About 25 miles east of Phoenix, the Salt River is joined by its major tributary, the Verde River. The Salt River, now a dry riverbed, was a perennial stream before water conservation reservoirs were constructed on the upper part of the watershed in the early 1940s. Water is released from the reservoirs into the channels of the Salt and Verde Rivers and flows downstream to Granite Reef Dam, a low-head diversion dam, where it is diverted into two canals for irrigation and municipal use in and near Phoenix (Adams, 1974; Mann and Rohne, 1983). Surface water supplies 80 percent of the city's drinking water; the remaining 20 percent is supplied by water wells (Swanson, 1988). Water for the airport and the Base is provided by the city of Phoenix municipal water system.

The Base is located adjacent to the Salt River and the southern perimeter of the Base is within its 100-year flood plain (Airport Master Plan, 1983). Storm drainage from the urban area of Phoenix flows from north to south to outfalls into the Salt River channel. A secondary system on the airport collects drainage from the airfield and developed areas (including the Base), connects with the city system, and outfalls into the Salt River at 32nd Street. Effluent from the Nose Dock (Building No. 25) oil/water separator

(OWS) discharges to this storm drainage system. Storm runoff from the flight-line and washrack flows into an OWS/water treatment facility next to the washrack; this runoff is then discharged to the sanitary sewer. Although some of the storm drainage which reaches the Salt River Channel is lost to evaporation or transpiration, most infiltrates into the dry river bed and recharges groundwater supplies. Any pollutants discharged into the storm drainage system or onto the ground can also enter the groundwater easily with the infiltrating rainfall.

The Papago Military Reservation is not within a 100-year flood plain. Storm runoff at the 107th TCS and 111th ATCF flows off Air National Guard property along the surface; there is no storm drainage system in this area.

Groundwater

In addition to water supplied by the reservoirs on the Salt and Verde Rivers, groundwater is also a source of water in the Phoenix area. The basement complex is of no significance as a source of groundwater except in local areas where the middle Tertiary sedimentary and volcanic rocks are saturated. The main sources of groundwater in the Phoenix area are the valley fill deposits. Although these deposits are very heterogeneous, a three-fold division of the water-bearing units is possible based on lithology. The units are the Upper Alluvial Unit, the Middle Fine-Grained Unit, and the Lower Conglomerate Unit (U.S. Bureau of Reclamation, 1976).

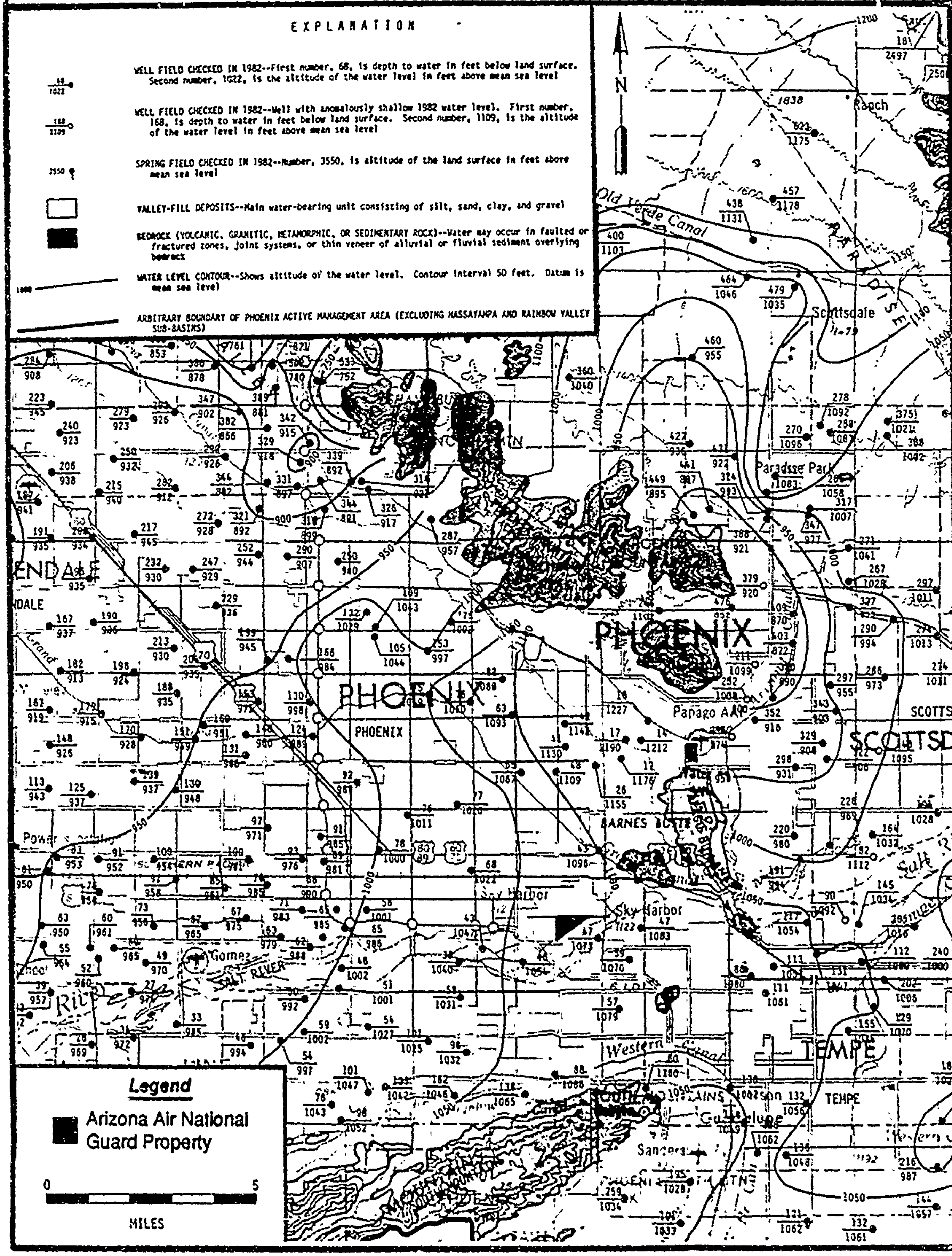
The primary source of groundwater in the Phoenix area is the Upper Alluvial Unit. Groundwater within this aquifer is usually unconfined, but semiconfined conditions exist locally where there is an increase of finer-grained materials (U.S. Bureau of Reclamation, 1976). Perched conditions also exist in some localities. Beneath the Base, groundwater in this upper aquifer occurs at a depth of approximately 45 feet. Groundwater flow is towards the west or southwest (Reeter and Remick, 1986). According to the Arizona Department of Water Resources, the nearest water well is located approximately 3,500 feet southeast of the Base (Figure 3).

HMTD

Source: Arizona Dept. of Water Resources, Hydrologic Map Series, Report No. 12

Figure 3.

Map showing depth to water and altitude of the water table in the Phoenix, Arizona area, 1983.



At the Papago Military Reservation, groundwater occurs within the soil and weathered breccia bedrock. The water table is encountered at a depth of approximately 15 feet; groundwater flow is towards the west (Reeter and Remick, 1986). The nearest well is located approximately 4,000 feet northeast of the Papago Military Reservation (Figure 3).

A second source of groundwater is the Lower Conglomerate Unit. Groundwater within this aquifer occurs under confined conditions where it is overlain by the Middle Fine-Grained Unit. Where the middle unit is missing, only one water body is recognized (U.S. Bureau of Reclamation, 1976).

The Middle Fine-Grained Unit, which separates the two main water-bearing units, is considered to be an aquiclude, but it does yield minor quantities of water from sand and gravel horizons. Groundwater in this unit probably occurs under semiconfined to confined conditions; evaporite minerals (halite, gypsum, and anhydrite) make much of the water too salty to use.

E. Critical Environments

According to the Arizona Game and Fish Department, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the Base or the Papago Military Reservation. Furthermore, there are no critical habitats, wetlands, or wilderness areas within a 1-mile radius of these properties.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with Base personnel resulted in the identification of specific operations at the Base in which the majority of industrial chemicals are handled and hazardous wastes are generated. A total of 26 past and present Base personnel, with an average of 16.5 years experience, were interviewed. These personnel were representative of Facilities Management; Vehicle Maintenance; Aerospace Ground Equipment (AGE) Maintenance; Fire Department; Supply; Safety; Petroleum, Oils, and Lubricants (POL) Management; Aircraft Maintenance; Flightline; Weapons Maintenance; Corrosion Control; Aerospace Systems; Battery Shop; Propulsion Shop; and Civil Engineering. Table 1 summarizes these major operations, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. Based on information gathered, any operation that is not listed in Table 1 has been determined to produce negligible quantities of wastes requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with Base personnel and subsequent site inspections resulted in the identification of five sites potentially contaminated with HM/HW. Figures 4A and 4B illustrate the locations of the identified sites. Each of the five sites was assigned a HAS according to HARM (Appendix C). Copies of the completed Hazardous Assessment Rating Forms are found in Appendix D. Table 2 summarizes the HAS for each of the scored sites. The objective of this assessment is to provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). Brief descriptions of all the sites follow.

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Aircraft Maintenance Bldg. No. 25	PD-680	1,000	STORM — OWS STORM — DRMO
	JP-4	200	STORM — OWS STORM — CONTR
	7808 Oil	20	STORM — OWS STORM — CONTR
	Hydraulic Oil	50	STORM — OWS STORM — CONTR
	Engine Oil	200	STORM — OWS STORM
	AVGAS	100	STORM — OWS STORM
Aerospace Ground Equipment (AGE) Maintenance Bldg. No. 8	Engine Oil	100	FTA — CONTR
	Hydraulic Oil	30	FTA — CONTR
	PD-680	30	FTA — DRMO
	Battery Acid	50	NEUTR SAN — DRMO

KEY:

CONTR - Disposed of by a contractor
DRMO - Disposed of through the Defense Reutilization and Marketing Office
FTA - Burned at Fire Training Area
GRND - Disposed of on ground
NEUTR SAN - Neutralized and disposed of in drains leading to sanitary sewer
OWS - Disposal through oil/water separator
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Sent to silver recovery offbase
SPLY - Sent to supply for recovery
STORM - Disposed of in drains leading to storm drainage system
TRASH - Disposed with municipal trash pick-up

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Vehicle Maintenance Bldg. No. 23	Engine Oil	285	|------------FTA--------------------|--CONTR---|
	PD-680	300	|-------FTA--------|--CONTR---|
	Battery Acid	30	|---------NEUTR SAN-----------------|----DRMO----|
	JP-4	200	|------------FTA--------------------|--CONTR---|
	Ethylene Glycol	55	|------------SAN--------------------|--CONTR---|
	Lubricating Oil	10	|------------FTA--------------------|--CONTR---|
	Hydraulic Oil	3	|------------FTA--------------------|--CONTR---|
	Transmission Fluid	8	|------------FTA--------------------|--CONTR---|
	Paint Thinner (MEK)	5	|------------FTA--------------------|----DRMO---|
	Brake Fluid	2	|------------FTA--------------------|--CONTR---|
Fuels Management Bldg. No. 30	JP-4	1,200	|----------------FTA----------------|--CONTR---|
	AVGAS	2,000	|------FTA----|----CONTR---|
	Tank Cleaning Sludge	1,000	|---------CONTR-------------|

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STORM - Disposed of in drains leading to storm drainage system
TRASH - Disposed with municipal trash pick-up

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Weapons Maintenance Bldg. No. 20	Rifle Bore Cleaner	1	(1970–1980) FTA / GRND; (1980–1988) TRASH
	PD-680	4	(1970–1980) FTA / GRND; (1980–1988) DRMO
Corrosion Control Bldg. No. 25	Thinners (MEK)	150	OWS / STORM; DRMO
	Paint Strippers	50	OWS / STORM
	Lacquer	10	OWS / STORM; DRMO
	Aliphatic Naphtha	10	OWS / STORM; DRMO
	Carbon Cleaner	20	OWS / STORM

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SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Sent to silver recovery offbase
SPLY - Sent to supply for recovery
STORM - Disposed of in drains leading to storm drainage system
TRASH - Disposed with municipal trash pick-up

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Paint Shop Bldg. No. 25	Solvents	10	(~1983) --SAN-- | -DRMO-- (1988)
	Thinners	10	(~1983) --SAN-- | -DRMO-- (1988)
	Strippers (MEK)	260	(~1983) --SAN-- | -DRMO-- (1988)
	Stripper Residue	30	(~1983) ------SAN------ (1988)
	Residual Paint Containers	—	(~1983) -----TRASH----- (1988)
Entomology Bldg. No. 10	Motor Oil	5	(~1978) -------OWS----- | -CONTR- (1988)
	Engine Oil	5	(~1978) -------OWS----- | -CONTR- (1988)
	Empty Pesticide Containers (triple rinsed)	50	(~1978) ---------TRASH-------- (1988)
Energy Plant Bldg. Nos. 2 & 18	Boiler Feedwater Treatment	52	(1950) -------------------STORM------------------- (1988)
	Algae & Slime	4	(1950) --------------------GRND-------------------- (1988)
	Cooling Water & Cooling Tower Treatment	100	(1950) --------------------GRND-------------------- (1988)
	Waste Oil	1	(1950) --------------------CONTR-------------------- (1988)

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SPLY - Sent to supply for recovery
STORM - Disposed of in drains leading to storm drainage system
TRASH - Disposed with municipal trash pick-up

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Hangar Spaces Bldg. No. 25	JP-4	50	FTA — CONTR
	PD-680	100	FTA — CONTR
	7808 Oil	500	CONTR
	5606 Oil	75	FTA — CONTR
	1100 Oil	2,000	FTA
Plumbing Shop Bldg. No. 10	Cutting Oil	2	OWS
Battery Shop Bldg. No. 24	Used Nickel-Cadmium Battery Cells	60	SPLY — DRMO
Photo Lab Bldg. No. 2	Developer	120	SIL REC
	Fixer	24	SIL REC
	Acetic Acid	120	STORM
	Color Dye Bleach	20	STORM

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SAN - Disposed of in drains leading to sanitary sewer
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SPLY - Sent to supply for recovery
STORM - Disposed of in drains leading to storm drainage system
TRASH - Disposed with municipal trash pick-up

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Propulsion Shop Bldg. No. 2	PD-680	15	SPLY
	Carbon Cleaner	10	OWS SAN
	Strippers	1	OWS SAN
	7808 Oil	145	CONTR
	Hydraulic Oil	4	CONTR
	1010 Engine Oil	120	CONTR
	Cleaning Solution (20/20 NV)	20	OWS SAN
Vehicle Maintenance (107th TCS) Bldg. No. 112	Engine Oil	360	CONTR SPLY
	PD-680	80	CONTR SPLY
	JP-4	25	CONTR SPLY
	Ethylene Glycol	30	OWS SAN
	10W Engine Oil	40	CONTR SPLY

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OWS - Disposal through oil/water separator
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Sent to silver recovery offbase
SPLY - Sent to supply for recovery
STORM - Disposed of in drains leading to storm drainage system
TRASH - Disposed with municipal trash pick-up

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Continued)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Vehicle Maintenance (107th TCS) (Continued) Bldg. No. 112	Transmission Fluid	5	1980–1988: CONTR SPLY
	Paint Thinner	10	1980–1988: CONTR SPLY
	Brake Fluid	6	1980–1988: CONTR SPLY
	Diesel Fuel	15	1980–1988: CONTR SPLY
Battery Shop (107th TCS) Bldg. No. 112	Used Batteries	40	1980: SPLY; then DRMO to 1988
	Battery Acid	40	1980: NEUTR SAN; then DRMO to 1988
Fuels Management (107th TCS) Bldg. No. 112	Diesel Fuel	25	1980–1988: CONTR SPLY
Aerospace Ground Equipment (AGE) Maintenance (107th TCS) Bldg. No. 112	Engine Oil	120	1980–1988: CONTR
	Paint Strippers/ Thinners	10	1980–1988: CONTR
	JP-4	50	1980–1988: CONTR SPLY
	PD-680	10	1980–1988: CONTR SPLY
	Parts Cleaner	10	1980–1988: CONTR
	Turbine (7808) Oil	140	1980–1988: CONTR

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SPLY - Sent to supply for recovery
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Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Arizona Air National Guard, Sky Harbor International Airport, Phoenix, Arizona (Concluded)

Shop Name and Location	Hazardous Waste/ Used Hazardous Material	Current Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 1960 1970 1980 1988
Aerospace Ground Equipment (AGE) Maintenance (107th TCS) (Continued) Bldg. No. 112	Battery Acid	20	1980–1988: NEUTR SAN, then DRMO
	MEK	4	1980–1988: DRMO
Aerospace Ground Equipment (AGE) Maintenance (111th ATCF) Bldg. No. 116	Engine Oil	17	1980–1988: CONTR
	Battery Acid	4	1980–1988: NEUTR SAN, then DRMO
Vehicle Maintenance (111th ATCF) Bldg. No. 116	Engine Oil	169	1980–1988: CONTR
	Battery Acid	15	1980–1988: NEUTR SAN, then DRMO
	Ethylene Glycol	56	1980–1988: CONTR
	Hydraulic Oil	25	1980–1988: CONTR
	Transmission Fluid	70	1980–1988: CONTR
	Brake Fluid	10	1980–1988: CONTR
	Bearing Grease	30	1980–1988: CONTR
Battery Shop (111th ATCF) Bldg. No. 116	Used Batteries	6 each	Late 1980s–1988: DRMO
	Battery Acid	15	Late 1980s–1988: DRMO

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SAN - Disposed of in drains leading to sanitary sewer
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TRASH - Disposed with municipal trash pick-up

HMTC

Source: Arizona
Air National Guard,
Base Map.

Figure 4A.
Location of Sites at Arizona Air National Guard,
Sky Harbor International Airport, Phoenix, Arizona.

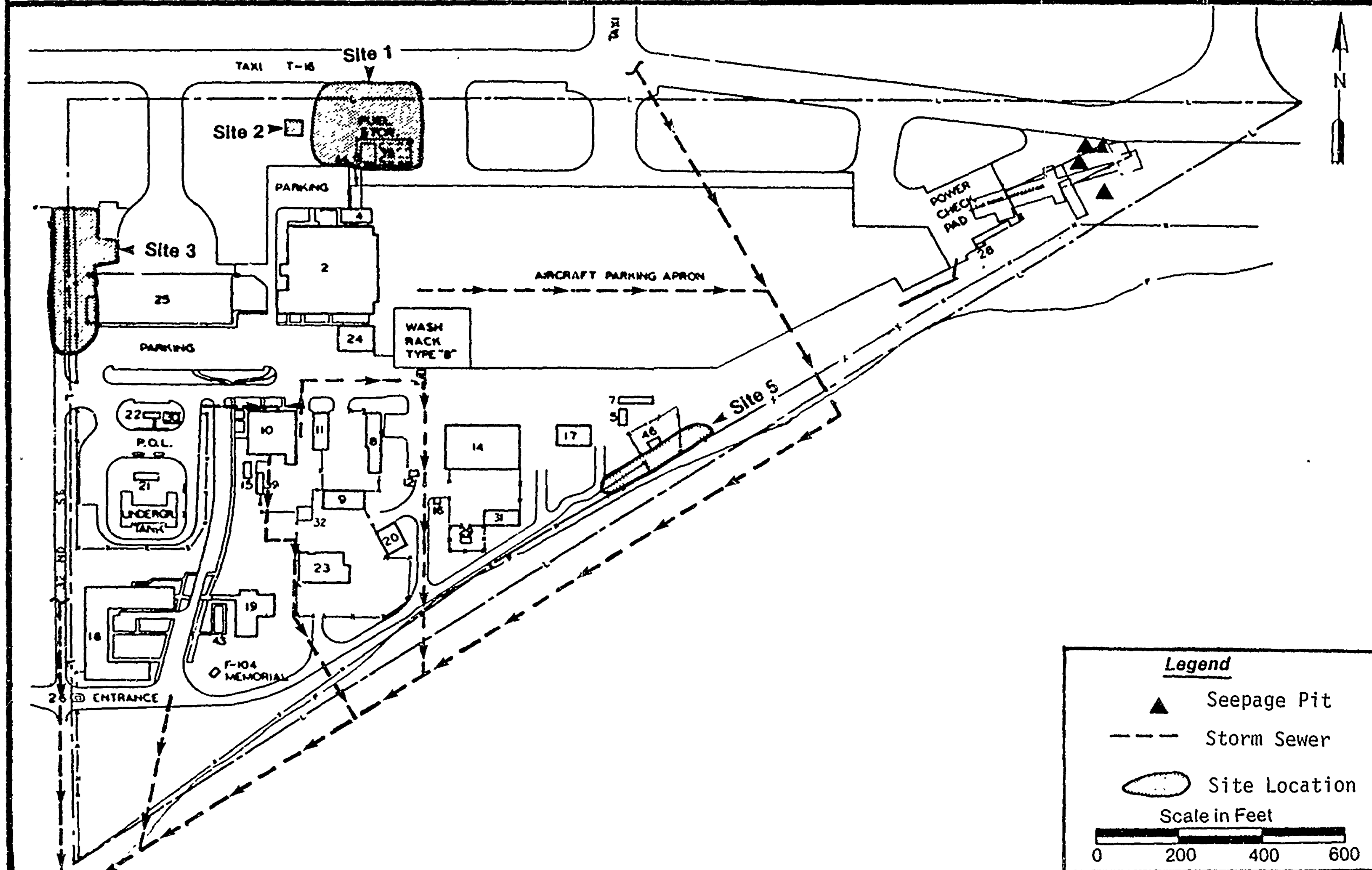

Figure 4B.
Location of Sites at Arizona Air National Guard, Papago Military Reservation, Phoenix, Arizona.

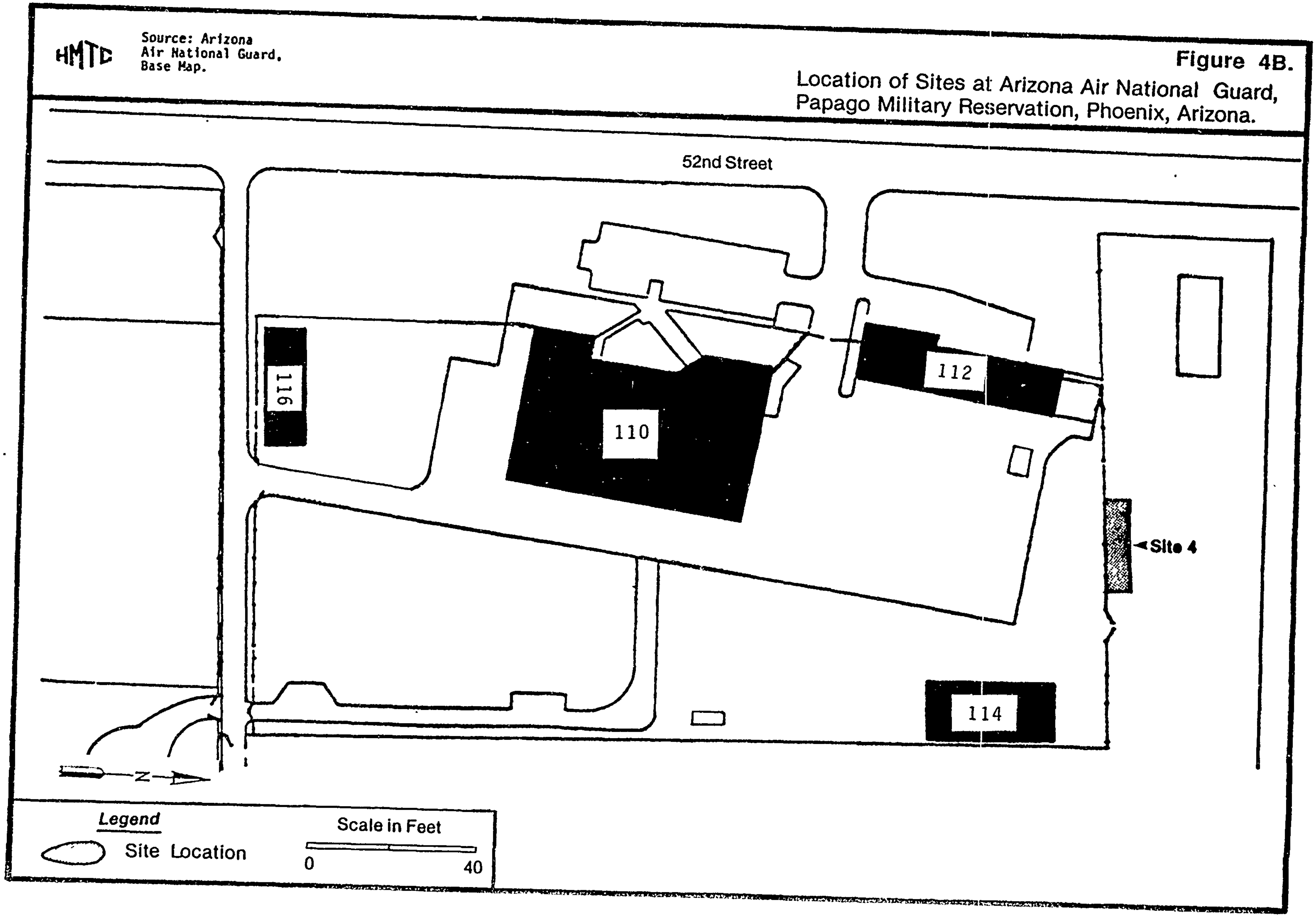

Table 2. Site Hazard Assessment Scores (as Derived from HARM): Arizona Air National Guard, Sky Harbor International Airport and the Papago Military Reservation, Phoenix, Arizona

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	3	Fuel Bladder Area	58	64	37	1.0	53
2	2	Hazardous Waste Storage Area	58	48	35	1.0	47
3	1	JP-4 Hydrant Area	58	48	35	0.95	45
4	4	107th TCS Hazardous Waste Collection Area	58	48	28	1.0	45
5	5	Ammunition Dump	58	30	37	1.0	42

Site No. 1 - JP-4 Hydrant Area (HAS-45)

Surface drainage on the northern portion of the aircraft parking apron flows west onto an area of exposed soil around the JP-4 hydrant refueling system. Any JP-4 spilled from aircraft onto this portion of the apron also flows or is washed down onto this area. Two to three small spills also occur at the hydrants per year. Most recently, in February 1988, a high level valve at the hydrant area malfunctioned and 20 gallons of JP-4 spilled. The JP-4 was washed down onto the soil area. At the time of the site visit, this area smelled heavily of JP-4. Since the JP-4 hydrants are in this area, the source of the smell could not be determined. The ground was wet and/or stained from runoff from recent rains. This site was scored on the basis of a "small" quantity release (less than 1,100 gallons).

Site No. 2 - Hazardous Waste Storage Area (HAS-47)

The hazardous waste storage area is located west of the JP-4 hydrant system and is a 20- by 30-foot rectangular area enclosed by an 8-foot-high brick wall and chain-link fencing. The facility, which has no roof or containment structures, has been in existence for 5 or 6 years. Full drums are pumped out periodically by a DRMO contractor. At the time of the site visit, the storage area contained one drum for PD-680 solvent, one drum for waste JP-4, three drums for waste hydraulic fluid, and three drums for waste 7808 oil. The drums were well marked and were on pallets on a concrete pad. Covered funnels were in the top of some of the drums. The metal drums were grounded. The ground next to the concrete pad was very stained from spillage. Although the amount of HM/HW released at this site could not be determined, the site was scored on the basis of a "small" quantity release.

Site No. 3 - Fuel Bladder Area (HAS-53)

In 1972, JP-4 and leaded AVGAS were stored in three 30,000-gallon bladders on airport property just west of the Nose Dock (Building No. 25) while the

POL area was being refurbished. During the time the bladders were used (8 months to 1 year), one of the AVGAS bladders leaked continuously from around an inspection hatch. No estimate could be made of the amount of fuel lost. Because fuel leaked continuously for a long period at this site, the site was scored on the basis of a "moderate" quantity release (between 1,100 and 4,675 gallons).

Site No. 4 - 107th TCS Hazardous Waste Collection Area (HAS-45)

At the 107th TCS, located at the Papago Military Reservation about 4 miles northeast of the Base, hazardous wastes are accumulated in 55-gallon drums within the fenced, gravelled vehicle parking area. Drums of used JP-4, turbine engine oil, 90W gear oil, diesel fuel, PD-680 solvent, and MOGAS are stored on pallets on the gravel. Covered funnels are in the top of each drum. Full drums are taken to the hazardous waste storage area at the Base to be pumped out by the DRMO contractor. At the time of the site visit the gravel was stained, and the gear oil drum had overflowed. Although the exact amount of HM/HW released at this site could not be determined, the site was scored on the basis of a "small" quantity release.

Site No. 5 - Ammunition Dump (HAS-42)

About 10 years ago, buried 50-caliber ammunition was discovered during trenching operations east of the Flightline Buildings (Buildings No. 5 and 7). The ammunition was found at a depth of 6 to 8 feet. Unfired ammunition was buried in this area from 1952 until 1957 or 1958. More ammunition is believed to be buried in this area. The site was scored on the baisis of a "small" quantity (less than 5 tons) and a "high" hazard rating (for ignitability).

C. Other Pertinent Facts

Thirty-four underground storage tanks (USTs) were identified at the Base during the Preliminary Assessment; six additional USTs were identified at the Papago Military Reservation. Table 3 lists the location and characteristics

of these USTs. Maps showing the locations of these USTs are included as Appendix E.

Other pertinent facts discovered during the Preliminary Assessment include:

- No landfills exist on Base property.

- No disposal of radioactive material has occurred on Base property.

- Sewage from most of the Base is received by the City of Phoenix Sanitary System in main lines located in 24th Street on the west side of the Base. A 750-gallon septic tank is located at the T-9 Noise Suppressor. A 1,000-gallon septic tank is located at the Base Fire Station. The septic tanks were inspected by a representative from the U.S. Environmental Protection Agency (EPA) Region IX office on 17 July 1987.

- Four gravel-filled seepage pits are located at the T-9 Noise Suppressor (see Figure 4A). Two seepage pits receive effluent from the OWS. A third seepage pit receives effluent from the septic tank. The fourth seepage pit receives storm runoff. The seepage pits were also inspected by EPA on 17 July 1987.

Table 3. Underground Storage Tank Inventory, Arizona Air National Guard, Phoenix, Arizona

	TANK LOCATION IDENTIFICATION									
	A	B	C	D	E	F	G	H	I	J
Base/Facility Location	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility	161st POL Facility
Capacity (gallons)	50,000	50,000	25,000	25,000	25,000	25,000	50,000	50,000	7,500	4,000
Contents	JP-4	JP-4	JP-4	JP-4	JP-4	JP-4	JP-4	JP-4	JP-4	Diesel Fuel
Year Installed	1976	1976	1953	1953	1953	1953	1976	1976	1976	1979
Material of Construction	Welded Steel	Welded Steel	Welded Steel	Welded Steel	Welded Steel	Welded Steel	Welded Steel	Welded Steel	Welded Steel	Fiber-glass
Coatings A. Interior B. Exterior	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Uncoated
Cathodic Protection	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	Sacrificial Anodes	None
Piping	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection
Status of Tank (date abandoned)	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use

Table 3. Underground Storage Tank Inventory, Arizona Air National Guard, Phoenix, Arizona (Continued)

TANK LOCATION IDENTIFICATION	K	L	M	N	O	P	Q	R	S	T
Base/Facility Location	161st POL Facility	161st Nose Dock (Bldg 25)	161st AGE (Bldg 12)	161st Operation & Training (Bldg 18)	161st AGE (Bldg 12)	161st JP-4 Hydrants (Bldg 75)	161st JP-4 Hydrants (Bldg 75)	161st JP-4 Hydrants (Bldg 75)	161st Motor Pool	161st Motor Pool
Capacity (gallons)	2,000	1,000	5,000	1,000	4,400	40,000	40,000	2,000	5,000	5,000
Contents	JP-4	Waste Oil	JP-4	Grease	Solar Water	JP-4	JP-4	JP-4	Unleaded Gasoline	Leaded Gasoline
Year Installed	1976	1960	1953	1960	1977	1978	1978	1978	1977	1977
Material of Construction	Welded Steel	Concrete	Welded Steel	Concrete	Concrete	Welded Steel	Welded Steel	Welded Steel	Fiber-glass	Fiber-glass
Coatings A. Interior B. Exterior	A. Epoxy B. Uncoated	A. Uncoated B. Uncoated	A. Epoxy B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Paint	A. Epoxy B. Uncoated	A. Epoxy B. Uncoated
Cathodic Protection	Sacri-ficial Anodes	None	Sacri-ficial Anodes	None	None	Sacri-ficial Anodes	Sacri-ficial Anodes	Sacri-ficial Anodes	None	None
Piping	Bare Steel with Cathodic Protection	Cast Iron	Bare Steel with Cathodic Protection	Cast Iron	Galvanized Steel	Bare Steel	Bare Steel	Bare Steel	Bare Steel with Cathodic Protection	Bare Steel with Cathodic Protection
Status of Tank (date abandoned)	In Use	In Use	In Use	In Use	Not In Use (1980)	In Use	In Use	In Use	In Use	In Use

Table 3. Underground Storage Tank Inventory, Arizona Air National Guard, Phoenix, Arizona (Continued)

TANK LOCATION IDENTIFICATION	U	V	W	X	Y	Z	A1	A2	A3	A4
Base/Facility Location	161st Motor Pool	161st Motor Pool	161st Motor Pool	161st Motor Pool	161st Engine Shop	161st Aero-Space Systems	161st T-9 Noise Suppr.	161st T-9 Noise Suppr.	161st T-9 Noise Suppr.	107th Motor Pool
Capacity (gallons)	350	200	900	500	50	15	150	300	9,400	4,000
Contents	JP-4/ Water	Acid/ Water	Water	Waste Oil	Waste Oil/Sand	Acid/ Water	Waste Oil/Water	Waste Oil	Water	Unleaded Gasoline
Year Installed	1977	1977	1977	1977	1977	1977	1976	1977	1977	1978
Material of Construction	Concrete	Concrete	Concrete	Fiber-glass	Concrete	Poly ethylene	Concrete	Welded Steel	Concrete	Fiber-glass
Coatings A. Interior B. Exterior	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Epoxy B. Uncoated	A. Uncoated B. Uncoated	A. Epoxy B. Paint	A. Uncoated B. Uncoated	A. Epoxy B. Uncoated
Cathodic Protection	None	None	None	None	None	None	None	Sacri-ficial Anodes	None	None
Piping	Cast Iron	Fiber-glass Rein-forced Plastic	Cast Iron	Cast Iron	Cast Iron	Fiber-glass Rein-forced Plastic	Cast Iron	Bare Steel	Cast Iron	Bare Steel with Cathodic Protection
Status of Tank (date abandoned)	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use

Table 3. Underground Storage Tank Inventory, Arizona Air National Guard, Phoenix, Arizona (Concluded)

	TANK LOCATION IDENTIFICATION									
	A5	A7	A8	A9	A10	A11	A12	A13	A14	A15
Base/Facility Location	107th Motor Pool	107th Motor Pool/AGE	107th Head-quarters	107th Head-quarters	107th Head-quarters	161st AGE	161st Washrack	161st T-9 Noise Suppr.	161st Motor Pool	161st Fire Station
Capacity (gallons)	8,000	8,000	1,000	100	150	150	7,000	750	500	1,000
Contents	Diesel Fuel	Solar Water	Waste Oil	Acid/Water	Waste Oil	Waste Oil	Waste Oil/Water	Water/Sewage	Oil	Water/Sewage
Year Installed	1978	1977	1978	1978	1980	1979	1966	1985	1979	1979
Material of Construction	Fiber-glass	Welded Steel	Fiber-glass	Concrete	Concrete	Concrete	Concrete	Concrete	Fiber-glass	Concrete
Coatings A. Interior B. Exterior	A. Epoxy B. Uncoated	A. Epoxy B. Paint	A. Epoxy B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. Uncoated B. Uncoated	A. None B. Fiber-glass	A. Uncoated B. Uncoated
Cathodic Protection	None	Sacri-ficial Anodes	None	None	None	None	None	None	None	None
Piping	Bare Steel with Cathodic Protection	Galvan-ized Steel	Bare Steel with Cathodic Protection	Fiber-glass Rein-forced Plastic	Bare Steel	Bare Steel	Cast Iron	Cast Iron	Cast Iron	Plastic (ABS)
Status of Tank (date abandoned)	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use	In Use

V. CONCLUSIONS

Information obtained through interviews with 26 past and present Base personnel, review of Base records, and field observations has resulted in the identification of five potentially contaminated disposal and/or spill sites on Base property. These sites consist of the following:

Site No. 1 - JP-4 Hydrant Area (HAS-45)
Site No. 2 - Hazardous Waste Storage Area (HAS-47)
Site No. 3 - Fuel Bladder Area (HAS-53)
Site No. 4 - 107th TCS Hazardous Waste Collection Area (HAS-45)
Site No. 5 - Ammunition Dump (HAS-42)

Each of these sites is potentially contaminated with HM/HW and each exhibit the potential for contaminant migration to groundwater and surface water. Therefore, these sites were assigned a HAS according to HARM.

VI. RECOMMENDATIONS

In accordance with applicable regulations, further IRP investigation is recommended at each of the five identified sites.

GLOSSARY OF TERMS

ALLUVIAL FAN - A low, outspread, relatively flat to gently sloping mass of loose rock material, shaped like an open fan, deposited by a stream (esp. in a semiarid region) at the place where it issues from a narrow mountain valley upon a plain.

ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or running water.

ANDESITE - A dark-colored, fine-grained extrusive (volcanic) rock composed primarily of the minerals feldspar, biotite, hornblende, and pyroxene.

ANHYDRITE - A mineral consisting of anhydrous calcium sulfate ($CaSO^4$) which usually occurs with gypsum and halite in evaporite deposits.

AQUICLUDE - A confining bed that prevents the flow of water to or from an adjacent aquifer.

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

BRECCIA - A coarse-grained clastic rock, composed of angular broken rock fragments held together by a mineral cement or in a fine-grained matrix.

CONGLOMERATE - A coarse-grained sedimentary rock, composed of rounded pebbles, cobbles, and boulders, set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRETACEOUS - The final period of the Mesozoic era, thought to have covered the span of time between 135 and 65 million years ago.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species, on which are found those physical or biological features essential to the conservation of the species and which may require special management consideration or protection.

DISCHARGE - The release of any waste stream or any constituent thereof to the environment which is not covered.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EVAPORITE - A nonclastic sedimentary rock composed primary of minerals produced from sea water as a result of extensive or total evaporation of the solvent.

EXTRUSIVE - Igneous rock that has been erupted onto the surface of the earth, including lava flows and volcanic ash.

GNEISS - A coarse-grained, foliated rock produced by regional metamorphism; commonly feldspar- and quartz-rich.

GRANITE - Broadly applied, any crystalline, quartz-bearing plutonic rock; also commonly contains feldspar, mica, hornblende, or pyroxene.

GRANITIC - Composed of granite.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

GYPSUM - A mineral consisting of hydrous calcium sulfate ($CaSO_4 \cdot 2\ H_2O$) which usually occurs with halite and anhydrite in evaporite deposits.

HALITE - Native salt (NaCl).

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5., 11 December 1981.

HAS - Hazard Assessment Score - The score developed by using the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

LACUSTRINE - Produced by or formed in a lake; deposited on the bottom of a lake.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure. Terms describing the permeability of soils are:

Very Slow	- less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	- 0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	- 0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)
Moderate	- 0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)
Moderately Rapid	- 2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)
Rapid	- 6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)
Very Rapid	- more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

PLAYA - A shallow, intermittent lake in an arid or semiarid region; a dry, flat area at the lowest part of an undrained desert basin, underlain by clay, silt, sand, and evaporite deposits, in which water gathers after a rain and is evaporated.

PLIOCENE - An epoch of the Tertiary period, after the Miocene and before the Pleistocene; thought to have covered the span of time between 5 and 1.8 million years ago.

RECENT - An epoch of the Quaternary period which covers the span of time from the end of the Pleistocene epoch, approximately 8 thousand years ago, to the present. Also called the Holocene epoch.

SCHIST - A medium or coarse-grained, strongly foliated, crystalline rock; formed by dynamic metamorphism.

PRECAMBRIAN - All geologic time, and its corresponding rocks, before the beginning of the Paleozoic; it is equivalent to about 90 percent of geologic time. The Precambrian ended approximately 570 million years ago.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

TERTIARY - The first period of the Cenozoic era, thought to have covered the span of time between 65 and 3 to 2 million years ago.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and manmade features.

VALLEY FILL - The unconsolidated sediment deposited by any agent so as to fill or partially fill a valley.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

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2. Johannessen & Girand Consulting Engineers, Inc. Soil Boring Log, Arizona Air National Guard, Phoenix, Arizona. Job No. 1997, Sheet C-5, 1975.

3. Mann, L.J. and Rohne, P.B. Streamflow Losses and Changes in Ground-water Levels along the Salt and Gila Rivers near Phoenix, Arizona - February 1978 to June 1980. USGS Water-Resources Investigations Report 83-4043, 1983.

4. National Oil and Hazardous Substances Contigency Plan, 47 Federal Register 31224-31235, 16 July 1982.

5. Reeter, R.W. and Remick, W.H. Maps Showing Groundwater Conditions in the West Salt River, East Salt River, Lake Pleasant, Carefree and Fountain Hills Sub-basins of the Phoenix Active Management Area, Maricopa, Pinal and Yavapai Counties, Arizona - 1983. Arizona Department of Water Resources Hydrologic Map Series Report No. 12, 1986.

6. Swanson, G.J. "Adding Quality to Phoenix Water." Water Well Journal 49 (April 1988), p. 40-42.

7. U.S. Bureau of Reclamation. Central Arizona Project - Geology and Ground-water Resources Report, Maricopa and Pinal Counties, Arizona. Vol. 1, p. 9-14, 39-51, 1976.

APPENDIX A

Resumes of HMTC Preliminary Assessment Team

JANET SALYER EMRY

EDUCATION

M.S., geology, Old Dominion University, 1987
B.S. (cum laude), geology, James Madison University, 1983

EXPERIENCE

Three years' technical experience in the fields of hydrogeology and environmental science, including drilling and placement of wells, well monitoring, aquifer testing, determination of hydraulic properties, computer modeling of aquifer systems, and field and laboratory soils analysis.

EMPLOYMENT

Dynamac Corporation (1987-present): Staff Scientist/Hydrogeologist

Responsibilities include Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, and Emergency Responses to include providing geological and hydrological assessments of hazardous waste disposal/spill sites, determination of rates and extents of contaminant migration, and computer modeling of groundwater flow and contaminant transport. Projects are for the U.S. Air Force and Air National Guard Installation Restoration Program.

Froehling and Robertson, Inc. (1986-1987): Geologist/Engineering Technician

Performed both field and laboratory engineering soils tests.

The Nature Conservancy (1985-1986): Hydrogeologist

Investigated groundwater geology of the Nature Conservancy's Nags Head Woods Ecological Preserve in Dare County, North Carolina. Study included installing wells, monitoring water table levels, determination of hydraulic parameters through a pumping test, stratigraphic test borings, and computer modeling.

Old Dominion University (1983-1985): Teaching Assistant, Department of Geological Sciences

Taught laboratory classes in Earth Science and Historical Geology.

PROFESSIONAL AFFILIATIONS

Geological Society of America
National Water Well Association/Association of Ground Water Scientists and Engineers

PUBLICATION

Impact of Municipal Pumpage Upon a Barrier Island Water Table, Nags Head and Kill Devil Hills, North Carolina. In: Abstracts with Programs, Geological Society of America, Vol. 19, No. 2, February 1987.

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., mechanical engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Twenty-nine years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager

Responsible for activities relating to Phases I, II and IV of the U.S. Air Force Installation Restoration Program including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; and preparation of Air Force Installation Restoration Program Management Guidance.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

NATASHA M. BROCK

EDUCATION

Graduate work, civil/environmental engineering, University of Maryland, 1987-present
Graduate work, civil/environmental engineering, University of Delaware, 1985-1986
B.S. (cum laude), environmental science, University of the District of Columbia, 1984
Undergraduate work, biology, The American University, 1978-1980

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Three years' experience in the environmental and hazardous waste field. Work performed includes remedial investigations/feasibility studies, RCRA facility assessments, comprehensive monitoring evaluations, and remedial facility investigations. Helped develop and test biological and chemical processes used in minimization of hazardous and sanitary waste generation. Researched multiple substrate degradation using aerobic and anaerobic organisms.

EMPLOYMENT

<u>Dynamac Corporation (1987-present)</u>: Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTC), performs Preliminary Assessments, Remedial Investigations and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Specifically involved in determining rates and extent of contamination, recommending groundwater monitoring procedures, and soil sampling and analysis procedures. In the process of preparing standard operating procedure manuals for quick remedial response to site spills and releases, and PA/RI/FS.

<u>C.C. Johnson & Malhotra, P.C. (1986-1987)</u>: Environmental Scientist

Involved as part of a team in performing Remedial Investigations/Feasibility Studies (RI/FS) for EPA Regions I and IV under Resource Conservation and Recovery Act (RCRA) work assignments for REM II projects. Participated on a team involved in RCRA Facility Assessments (RFAs), Comprehensive Monitoring Evaluations (CMEs), and Remedial Facility Investigations (RFIs) for EPA work assignments under RCRA for REM III projects in Regions I and IV. Work included solo oversight observations of field sampling and facility inspections. Additional responsibilities included promotion work, graphic layout, data entry-quality check for various projects. Certified Health & Safety Training Level C.

Work Force Temporary Services (1985-1986): Research Scientist

In working for DuPont's Engineering Test Center, helped in the development and testing of laboratory-scale biological and chemical processes for a division whose main purpose was to reduce the amount of hazardous waste generated. Also worked for Hercules, Inc., with a group involved in polymer use for wastewater treatment for clients in various industrial fields. Specifically involved in product consultation, troubleshooting, and product development.

National Oceanic and Atmospheric Administration (1982-1984): Research Assistant

Involved with an information gathering and distribution center of weather impacts worldwide. Specifically involved in data collection, distribution of data to clients, assessment production and special reports.

MARK D. JOHNSON

EDUCATION

B.S., geology, James Madison University, 1980

EXPERIENCE

Seven years' technical experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance and preparation of statements of work for the Air Force and the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Staff Scientist/Geologist

Primarily responsible for preparing statements of work for Phase IV-A of the Air Force's Installation Restoration Program, statements of work for Phase II and Phase IV-A of the Air National Guard's Installation Restoration Program, and assessing groundwater of hazardous waste disposal/spill sites on military installations for the purpose of determining rates and extents of contaminant migration and for developing site investigations, remedial investigations and identifying remedial actions. Prepared management guidance document for the Air Force's Installation Restoration Program.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers
British Tunneling Society

APPENDIX B

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1. Arizona Department of Water Resources
   99 East Virginia Avenue
   Phoenix, Arizona 85004

2. Arizona Game and Fish Department
   222 W. Greenway Road
   Phoenix, Arizona 85023

3. Federal Emergency Management Agency
   Flood Map Distribution Center
   6930 (A-F) San Tomas Road
   Baltimore, Maryland 21227-6227

4. National Oceanic and Atmospheric Administration
   6001 Executive Boulevard
   Rockville, Maryland 20853

5. U.S. Geological Survey
   12201 Sunrise Valley Drive
   Reston, Virginia 22092

6. U.S. Soil Conservation Service
   U.S. Department of Agriculture
   Washington, DC 20250

APPENDIX C

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Preliminary Assessment phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contaminant migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site the the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three stages. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ______________________________

LOCATION ______________________________

DATE OF OPERATION OR OCCURRENCE ______________________________

OWNER/OPERATOR ______________________________

COMMENTS/DESCRIPTION ______________________________

SITE RATED BY ______________________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C Land use/zoning within 1 mile radius		3		
D Distance to installation boundary		6		
E Critical environments within 1 mile radius of site		10		
F Water quality of nearest surface water body		6		
G Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	______	______

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ______

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C - confirmed, S - suspected) ______
3. Hazard rating (H - high, M - medium, L - low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
Subtotals			______	______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 X factor score/3) ______

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
Subtotals			______	______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = [ ]

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records

  Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200° F	Flash point at 140° F to 200° F	Flash point at 80° F to 140° F	Flash point less than 80° F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
	L	S	M
50	L	C	L
	M	S	H
	S	C	M
	S	S	H
40	M	S	M
	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
70	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8

B-3 Potential for Ground-Water Contamination -Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX D

Site Factor Rating Criteria and
Hazardous Assessment Rating Forms

161st Air Refueling Group
Arizona Air National Guard
Sky Harbor International Airport
Phoenix, Arizona

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

1. RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Population within 1,000 feet of site:	Greater than 100	3
Distance to nearest well:	3,001 feet to 1 mile	2
Land use/zoning with 1 mile radius:	Commercial/Industrial	2
Distance to installation boundary:		
Site No. 1	Immediately adjacent	3
Site No. 2	100 feet	3
Site No. 3	Outside Base property	3
Site No. 4	100 feet	3
Site No. 5	175 feet	3
Critical environments within 1 mile:	None	0
Water quality of nearest surface water body:	Potable water supplies	3
Groundwater use of uppermost aquifer:	Drinking water, municipal water available	2
Population served by surface water supply within 3 miles downstream of site:	None	0
Population served by groundwater supply within 3 miles of site:	Between 51 and 1,000	2

2. WASTE CHARACTERISTICS

Quantity:

Site No. 1	Less than 1,000 gallons	S
Site No. 2	Less than 1,000 gallons	S
Site No. 3	Between 1,000 and 5,000 gallons	M
Site No. 4	Less than 1,000 gallons	S
Site No. 5	Less than 5 tons	S

161st Air Refueling Group
Arizona Air National Guard
Sky Harbor International Airport
Phoenix, Arizona

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Confidence Level:		
Site No. 1	Confirmed	C
Site No. 2	Confirmed	C
Site No. 3	Confirmed	C
Site No. 4	Confirmed	C
Site No. 5	Confirmed	C
Hazard Rating:		
Toxicity		
Site No. 1	Sax Level 3	3
Site No. 2	Sax Level 3	3
Site No. 3	Sax Level 3	3
Site No. 4	Sax Level 3	3
Site No. 5	Sax Level 3	3
Ignitability		
Site No. 1	Flash point less than 80°F	3
Site No. 2	Flash point less than 80°F	3
Site No. 3	Flash point less than 80°F	3
Site No. 4	Flash point less than 80°F	3
Site No. 5	Flash point less than 80°F	3
Radioactivity	At or below background levels	0
Persistance Multiplier:		
Site No. 1	Straight chain hydrocarbons	0.8
Site No. 2	Straight chain hydrocarbons	0.8
Site No. 3	Straight chain hydrocarbons	0.8
Site No. 4	Straight chain hydrocarbons	0.8
Site No. 5	Metals	1.0
Physical State Multiplier:		
Site No. 1	Liquid	1.0
Site No. 2	Liquid	1.0
Site No. 3	Liquid	1.0
Site No. 4	Liquid	1.0
Site No. 5	Solid	0.5

161st Air Refueling Group
Arizona Air National Guard
Sky Harbor International Airport
Phoenix, Arizona

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. PATHWAYS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Surface Water Migration		
Distance to nearest surface water:		
Site No. 1	Between 501 feet and 2,000 feet	2
Site No. 2	Between 501 feet and 2,000 feet	2
Site No. 3	Less than 500 feet	3
Site No. 4	Greater than 1 mile	0
Site No. 5	Less than 500 feet	3
Net Precipitation:	-63 inches/year	0
Surface erosion:	Slight	1
Surface permeability:		
Site No. 1	4.2×10^{-4} to 1.4×10^{-3} cm/sec	1
Site No. 2	4.2×10^{-4} to 1.4×10^{-3} cm/sec	1
Site No. 3	Greater than 1.4×10^{-2} cm/sec	0
Site No. 4	4.2×10^{-4} to 1.4×10^{-3} cm/sec	1
Site No. 5	Greater than 1.4×10^{-2} cm/sec	0
Rainfall intensity:	1.5 inches	1
Flooding:	Beyond 100-year flood plain	0
Groundwater Migration		
Depth to groundwater:	11 to 50 feet	2
Net precipitation:	-63 inches/year	0
Soil permeability:		
Site No. 1	4.2×10^{-4} to 1.4×10^{-3} cm/sec	2
Site No. 2	4.2×10^{-4} to 1.4×10^{-3} cm/sec	2
Site No. 3	Greater than 1.4×10^{-2} cm/sec	3
Site No. 4	4.2×10^{-4} to 1.4×10^{-3} cm/sec	2
Site No. 5	Greater than 1.4×10^{-2} cm/sec	3
Subsurface flow:	Bottom of site greater than 5 feet above high groundwater level	0

161st Air Refueling Group
Arizona Air National Guard
Sky Harbor International Airport
Phoenix, Arizona

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. PATHWAYS CATEGORY (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Direct access to groundwater:	No evidence of risk	0
Practice:		
Site No. 1	Limited containment	0.95
Site No. 2	No containment	1.0
Site No. 3	No containment	1.0
Site No. 4	No containment	1.0
Site No. 5	No containment	1.0

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	JP-4 HYDRANT AREA (SITE 1)
LOCATION	ARIZONA AIR NATIONAL GUARD, PHOENIX
DATE OF OPERATION/OCCURRENCE	1952 TO PRESENT
OWNER/OPERATOR	161ST AREFG
COMMENTS/DESCRIPTION	
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	3	6	18	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	2	6	12	18
		SUBTOTALS		104	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <80 OR LESS> EXISTS, PROCEED TO B.
(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	1	8	8	24
SUBTOTALS				38	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

2. FLOODING

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	0	8	0	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				32	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					28

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(35)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(35)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(47)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(47)	(0.95)	=	45

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE HAZARDOUS WASTE STORAGE AREA (SITE 2)
LOCATION ARIZONA AIR NATIONAL GUARD, PHOENIX
DATE OF OPERATION/OCCURRENCE 1982 TO PRESENT
OWNER/OPERATOR 161ST AREFG
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	3	6	18	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	2	6	12	18
		SUBTOTALS		104	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <80 OR LESS> EXISTS, PROCEED TO B.

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	1	8	8	24
SUBTOTALS				38	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

2. FLOODING

FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	0	8	0	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				32	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					28

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(35)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(35)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(47)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(47)	(1)	=	47

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE FUEL BLADDER AREA (SITE 3)
LOCATION ARIZONA AIR NATIONAL GUARD, PHOENIX
DATE OF OPERATION/OCCURRENCE 1972
OWNER/OPERATOR 161ST AREFG
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	3	6	18	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	2	6	12	18
		SUBTOTALS		104	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (M)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (80)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(80)(0.8) = (64)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(64)(1) = (64)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.
(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	0	6	0	18
RAINFALL INTENSITY	:	1	8	8	24
SUBTOTALS				40	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					37

2. FLOODING

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	3	8	24	24
SUBSURFACE FLOWS	:	0	8	0	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				40	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(37)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(64)
PATHWAYS	(37)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(53)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(53)	(1)	=	53

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE HAZARDOUS WASTE COLLECTION AREA (SITE 4)
LOCATION ARIZONA AIR NATIONAL GUARD, PHOENIX
DATE OF OPERATION/OCCURRENCE 1978 TO PRESENT
OWNER/OPERATOR 107TH TCS
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	3	6	18	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	2	6	12	18
		SUBTOTALS		104	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	0	8	0	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	1	8	8	24
SUBTOTALS				22	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					20

2. FLOODING

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	0	8	0	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				32	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					28

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(28)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(28)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(45)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(45)	(1)	=	45

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HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE AMMUNITION DUMP (SITE 5)
LOCATION ARIZONA AIR NATIONAL GUARD, PHOENIX
DATE OF OPERATION/OCCURRENCE 1952 TO 1958
OWNER/OPERATOR 161ST AREFG
COMMENTS/DESCRIPTION
RATED BY HNTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	3	6	18	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	2	6	12	18
		SUBTOTALS		104	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(1) = (60)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(60)(0.5) = (30)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (80 OR LESS) EXISTS, PROCEED TO B.

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	0	6	0	18
RAINFALL INTENSITY	:	1	8	8	24
SUBTOTALS				40	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					37

2. FLOODING

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	3	8	24	24
SUBSURFACE FLOWS	:	0	8	0	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				40	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(37)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(30)
PATHWAYS	(37)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(42)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(42)	(1)	=	42

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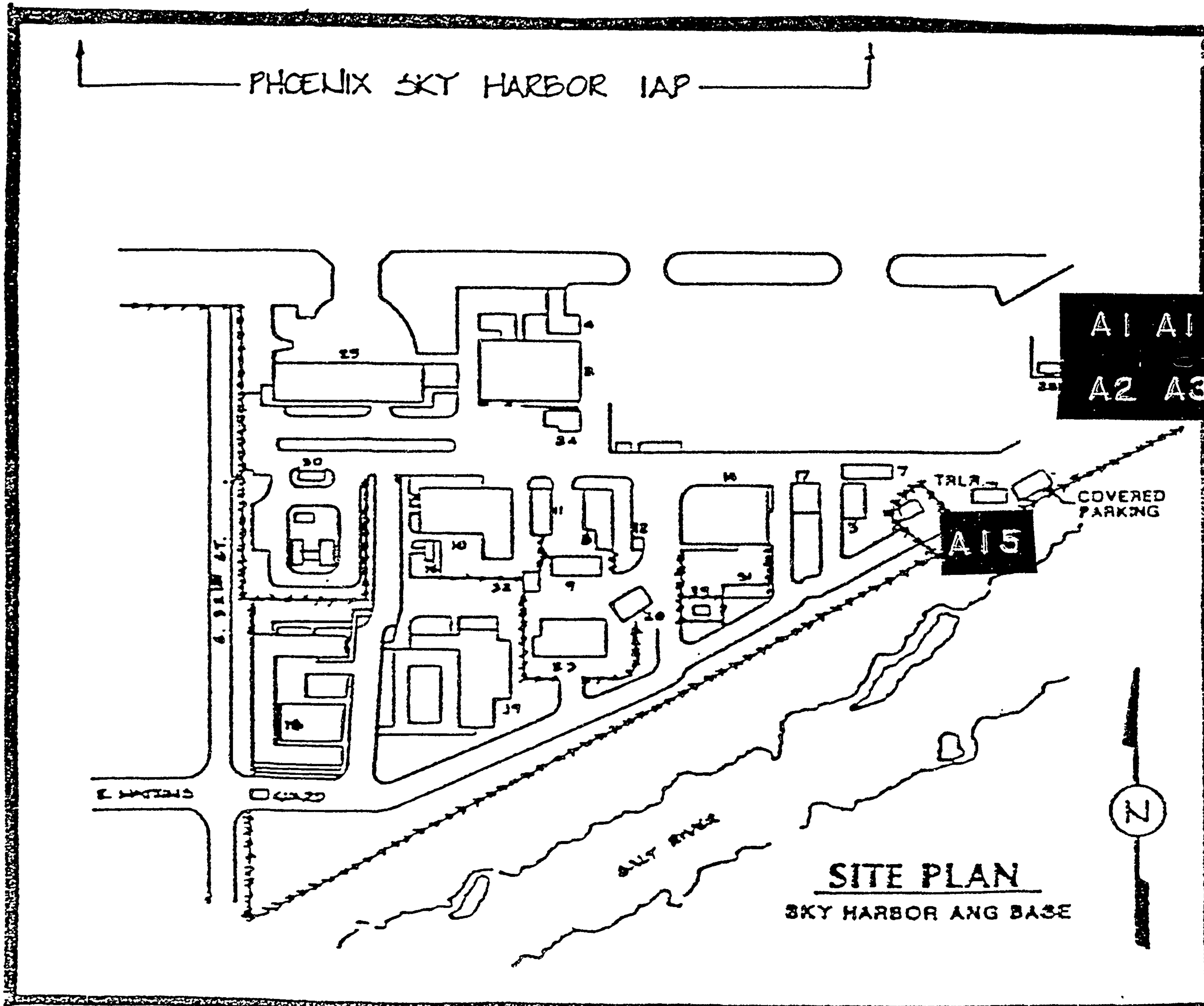
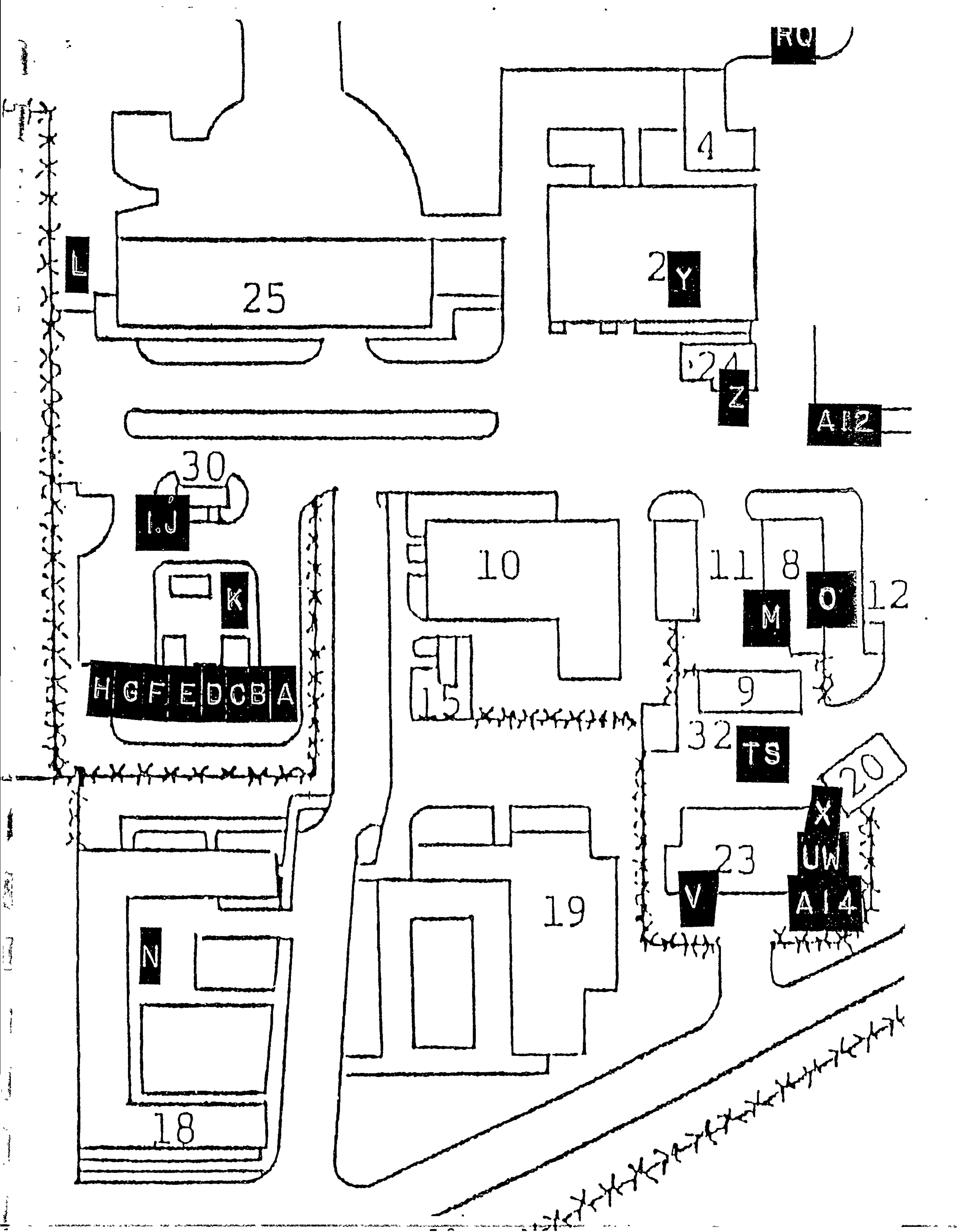
APPENDIX E

Underground Storage Tank Location Maps



PHOENIX SKY HARBOR IAP
A1 A13
A2 A3
A15
COVERED PARKING
TRLR
SALT RIVER
SITE PLAN
SKY HARBOR ANG BASE
N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2
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A12
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I.J
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H G F E D C B A
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32
TS
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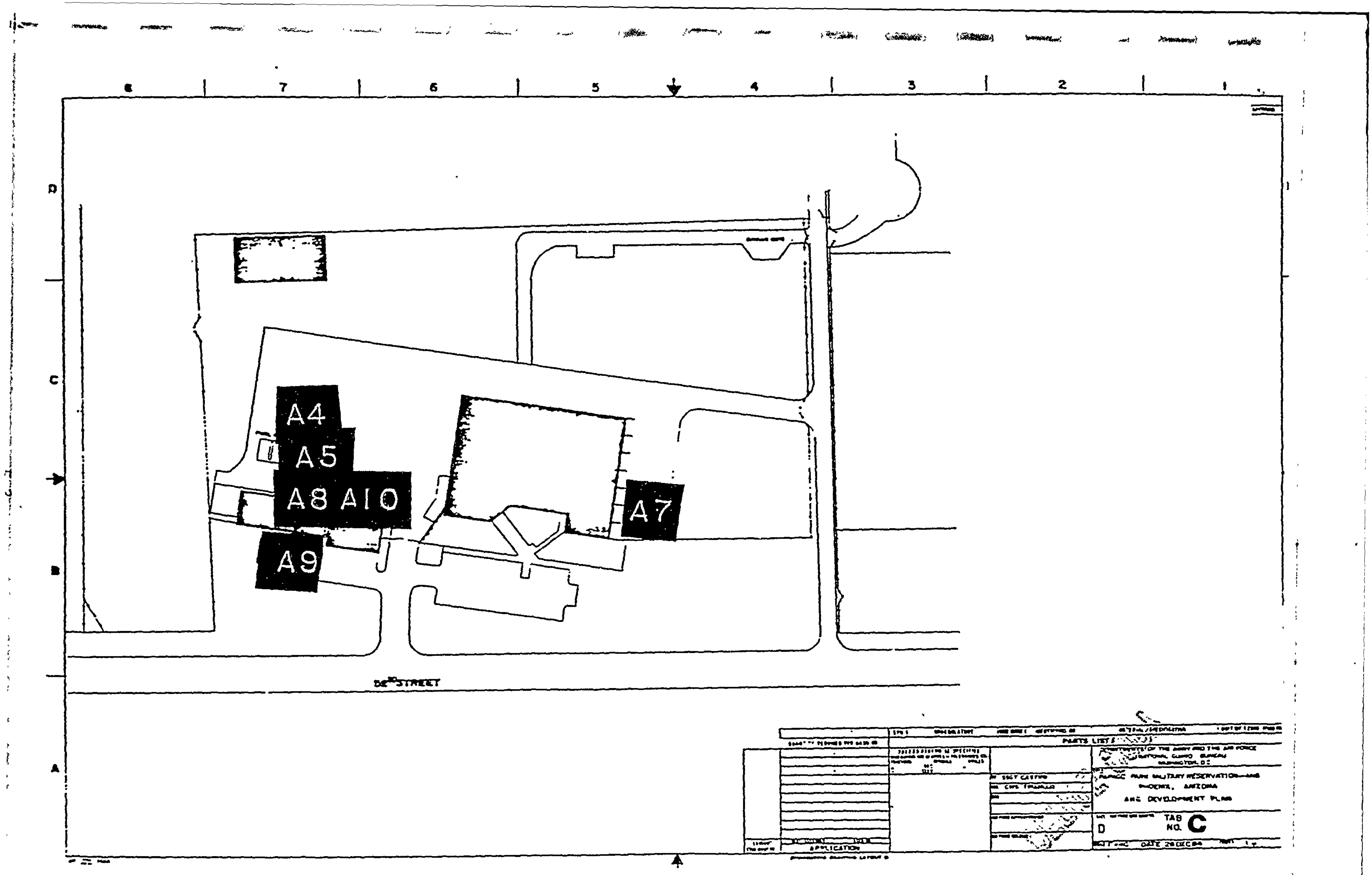
X
UW
23
V
A14
19
N
18



A4
A5
A8
A10
A9
A7
STREET
PARTS LIST
ANG DEVELOPMENT PLAN
PHOENIX, ARIZONA
TAB NO. C
D
APPLICATION